



FINAL  
TREATMENT, CONSOLIDATION, SAMPLING,  
AND ANALYSIS OF INVESTIGATION  
DERIVED WASTES (IDW) AT  
NAS WILLOW GROVE, PENNSYLVANIA

Contract No. N62472-86-C-1037

Prepared for:

United States Navy  
Northern Division  
Naval Facilities Engineering Command  
Lester, Pennsylvania 19113-2090

Prepared by:

EA Engineering, Science, and Technology, Inc.  
15 Loveton Circle  
Sparks, Maryland 21152

October 1992

EA Project 10388.08

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## EXECUTIVE SUMMARY

At the request of Northern Division of the Naval Facilities Engineering Command, EA Engineering, Science and Technology, Inc., inventoried and characterized 85 drums of waste currently stored at the Privet Road Compound. Sixty-five drums were comprised of Investigation Derived Waste (IDW) collected during drilling operations at the Navy Fuel Farm. The remaining 20 drums contained an unknown percentage of ethylene glycol mixed with water recovered from a spill site on the installation.

EA disposed of the liquid IDW by filtering through a carbon canister system and then composited the solid IDW as much as feasible. The remaining solid waste was analyzed for parameters necessary to assess proper disposal of the waste. The drums containing the ethylene glycol were sampled to determine an average concentration of ethylene glycol and biological oxygen demand for calculation of a loading rate for this waste water into the installation sewage treatment plant. Based on the results of the chemical analyses and applications of regulatory criteria, EA recommends that all 37 of the drums of solid waste may be disposed at a lined landfill permitted to accept fuel contaminated residual waste. The ethylene glycol waste water may be trickle-fed into the installation sewage treatment plant at a rate of 9 gal/hr, if the plant operating permit will allow disposal of this kind of waste. Otherwise the waste ethylene glycol may be disposed of at a permitted waste water disposal facility or recycled if a buyer can be located.

## 1. INTRODUCTION

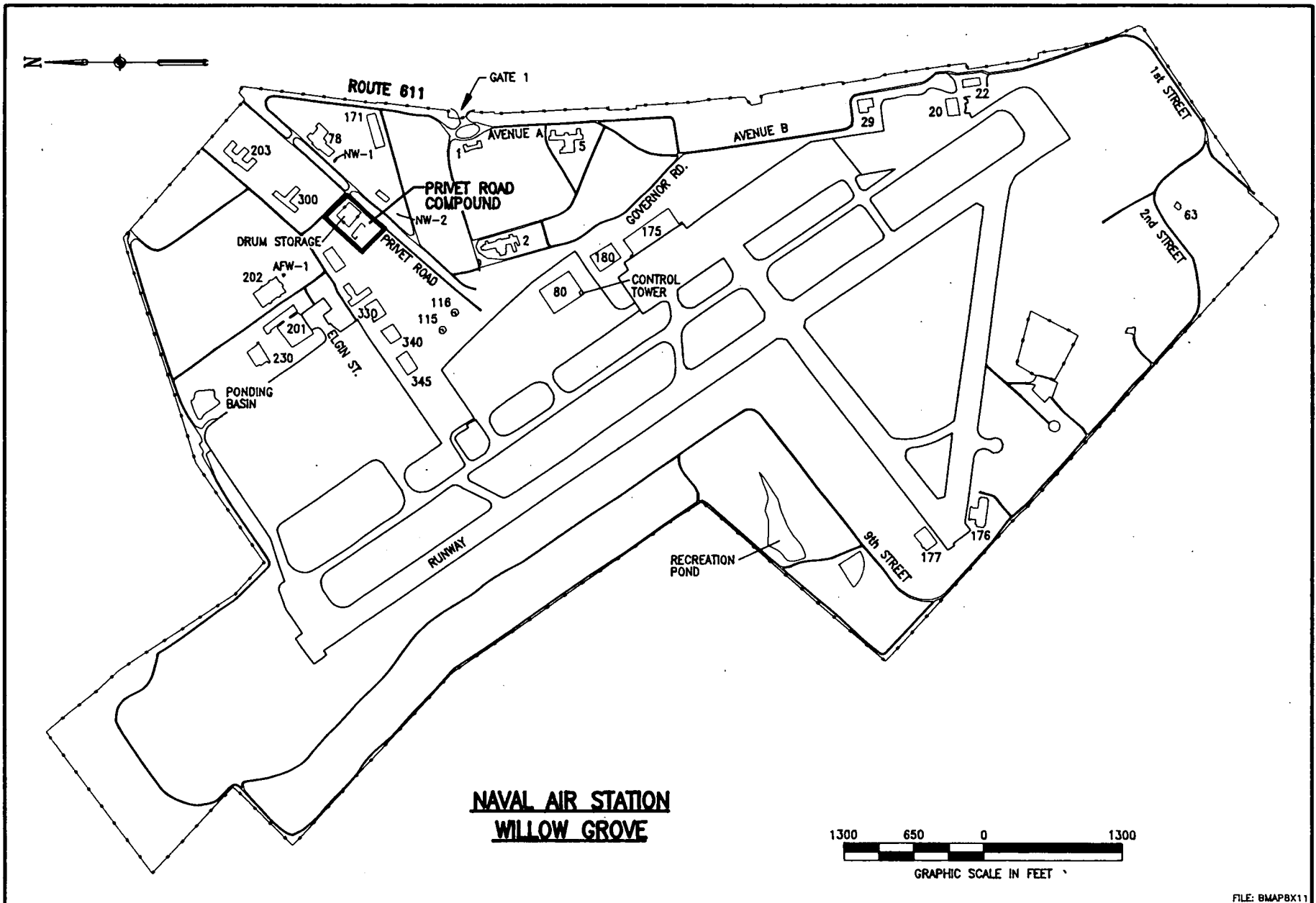
The Northern Division, Naval Facilities Engineering Command of the United States Navy requested EA Engineering, Science, and Technology to inventory, characterize, consolidate, and recommend for proper disposal, 85 55-gal drums containing Investigation Derived Waste (IDW) currently stored at the temporary waste storage facility located at the Privet Road Compound, Naval Air Station (NAS), Willow Grove. The site is shown in Figure 1-1. Thirty-four of the drums contained hydrocarbon contaminated soil generated during monitoring well installation at the Navy Fuel Farm. Thirty-one drums contained liquid hydrocarbon contaminated fluids derived from the same drilling operations. The remaining 20 drums contained a mixture of water and ethylene glycol (common radiator fluid).

Under the scope of the contract, the drums containing the liquid hydrocarbon-contaminated waste were decanted, the fluid processed through carbon adsorption canisters, and the effluent discharge to the installation sewage treatment plant. Any residual sediment was consolidated into one of two drums depending on the well associated with the drum sediment. The hydrocarbon-contaminated soil drums were staged into two groups based on likelihood of contamination. A composite sample was collected from each group. These two samples were submitted for analysis of U.S. EPA Toxicity Characteristic Leaching Procedure (TCLP), Federal Land Disposal Regulations (LDR) and Total Petroleum Hydrocarbons (TPH).

Three composite samples were collected from the 20 drums containing water and ethylene glycol. These samples were analyzed for ethylene glycol and Biological Oxygen Demand (BOD). Based on the results of these analyses, this waste will be disposed at the installation's Sewage Treatment Plant (STP) at a loading rate compatible with the STP processing capacity.



Chapter 2 discusses in detail the field methods followed to carry out the above tasks. Analytical results of the sampling are discussed in Chapter 3 and conclusions and recommendations are presented in Chapter 4.



FILE: BMAPBX11

 <b>EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.</b>	<b>NAVAL AIR STATION WILLOW GROVE</b> HORSHAM TOWNSHIP, PENNSYLVANIA	<b>FIGURE 1-1 SITE LOCATION MAP</b>	DESIGNED BY	DRAWN BY	DATE	PROJECT NO.
			GWC	PMS	7-14-92	10388.08
			CHECKED BY	PROJECT MGR.	SCALE	FIGURE NO.
			GWC	GWC	1"=1300'	1-1

## 2. FIELD METHODS

### 2.1 INITIAL INVENTORY

Figure 2-1 shows the disposition of drums inventoried by EA. Eighty-five drums were determined to be present at the Privet Road Compound. Each drum was numbered according to the Navy Fuel Farm well from which the waste was derived. Drums designated by Xs were derived from Navy Fuel Farm activities, but were not attributable to a specific well because labels had become unreadable. The remaining drums labeled EG/W contained a mixture of ethylene glycol and water recovered from a radiator fluid spill. In all, 65 drums of IDW were inventoried, of which 34 contained solid waste and 31 contained liquid waste. The remaining 20 drums contained EG/W waste water. Table 2-1 summarizes the drum inventory results. In addition to the above drums containing waste, two used carbon canisters and four drums of methanol were also discovered at the Privet Road Compound. The two used carbon canisters are probably left over from previous activities at the Navy Fuel Farm. The origin of the methanol is unknown.

### 2.2 TREATMENT AND CONSOLIDATION

#### 2.2.1 Solid Waste

Drums only partially filled with solid waste were composited with other drums from the same well group wherever possible to reduce the number of drums containing solid waste.

#### 2.2.2 Liquid Waste

The 31 drums containing hydrocarbon-contaminated IDW liquids were opened and the standing fluids were decanted. The liquid was pumped through a pre-filter bag to remove suspended solid and then the remaining liquid was pumped through two 55-gal activated

carbon canisters connected in series. The filtered effluent was then transported and discharged to the installation sewage treatment plant. Residual sediment from drums was composited into one of two drums depending on from which well the waste water originated (unless the residual sediment filled two-thirds or more of the drum, in which case the sediment was left in the drum).

Drum X-3 at location Row 3, Column 2 was found to contain approximately 25 gal of pure product. It was resealed and left untreated.

### 2.2.3 Final Inventory

Figure 2-2 shows the disposition of drums remaining after treatment and consolidation. Table 2-2 summarizes the final drum inventory of IDW. The total number of drums containing IDW has been reduced from 85 to 61, a reduction of 24 drums. The number of drums containing solids actually increased due to the conversion of some drums labeled liquid to solid following decanting and the addition of the two composite residual sediment drums, labeled G-1 and G-2, to the inventory. These drums are each approximately half full. Empty drums were turned over to installation personnel.

## 2.3 SAMPLING

### 2.3.1 Solid Waste

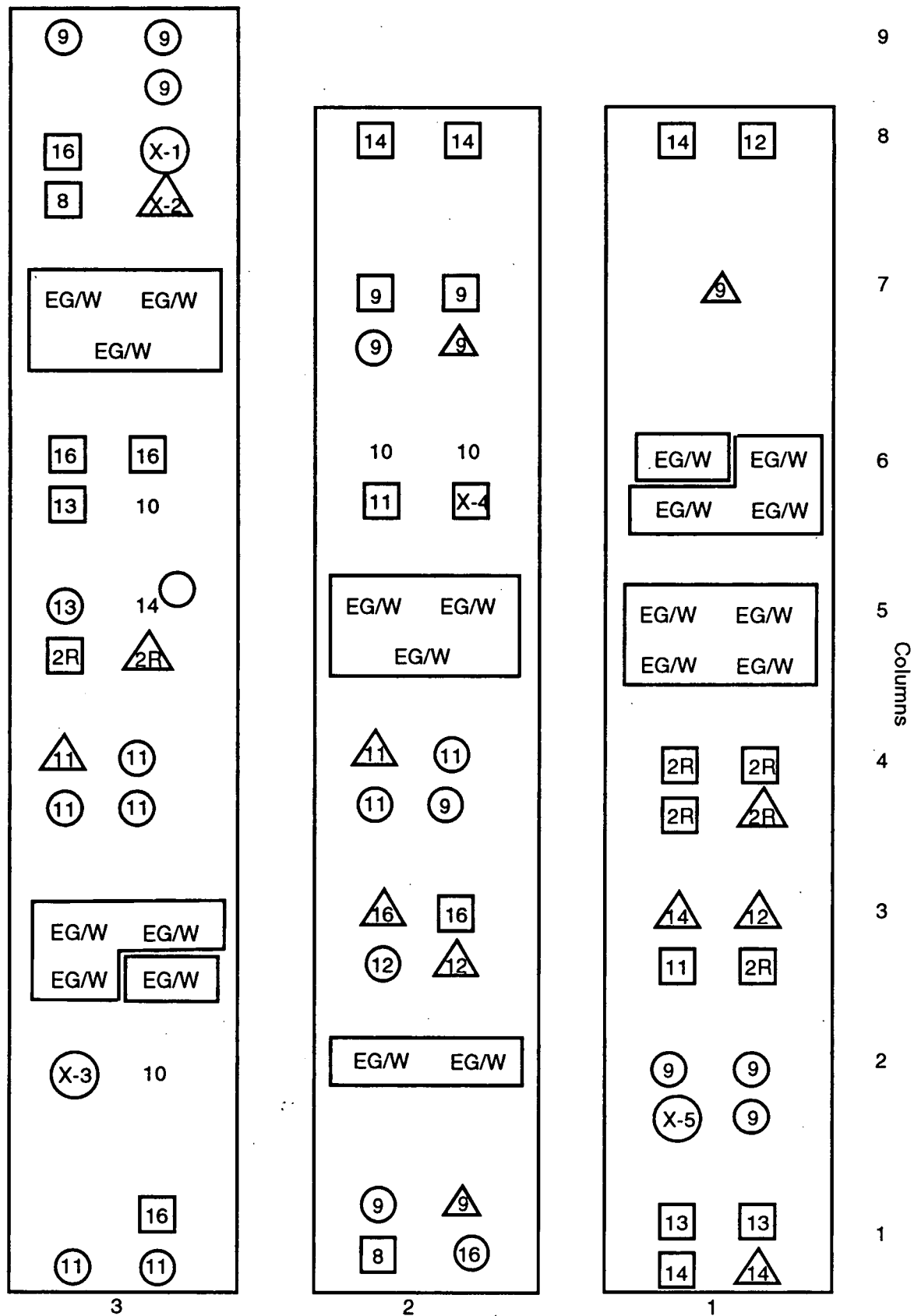
After removal and treatment of hydrocarbon-contaminated fluids, the remaining drums of solid waste were divided into two groups depending on origin. Group WG1-DS included all drums from Navy Fuel Farm wells NFFW-9, 11, and 12. The soil/sediment from drilling activity associated with these wells was anticipated to be less contaminated judging by previous analytical results from these wells. Group WG2-DS consisted of soil/sediment from Navy Fuel Farm wells NFFW-2R, 8, 13, 14, 16, and any identified Navy Fuel Farm solid waste. It was anticipated that this soil/sediment might show higher levels of contamination

based on previous analytical results from these wells. Soil from Navy Fuel Farm well NFFW-10 was not collected because previous analytical results from this well showed no contamination and no organic vapors were detected during drilling.

A composite sample was collected from each group of drums using a dedicated 8 oz. stainless steel scoop. Approximately 4 oz. of material was removed from each drum of a given group and then composited in a stainless steel bowl. The actual compositing was done as quickly as possible to limit volatile organic compound (VOC) degassing. A composite sample from each group was placed in appropriate laboratory cleaned jars, VOC samples collected first, and then placed in a cooler on ice for shipment to the laboratory within 48 hours. The resulting two samples, WG1-DS and WG2-DS, were analyzed for TCLP and Land Ban VOC, SVOC, metals, pesticides, ignitability, corrosivity, reactivity and TPH. Chain of Custody (COC) protocols were followed as per EPA Contract Laboratory Program (CLP) procedures.

#### 2.3.2 Liquid Waste

The drums containing ethylene glycol and water were divided randomly into three subgroups. Three composite samples were collected, one for each group, by removing approximately 6 oz of fluid from each drum and compositing into one sample. Drums of ethylene glycol and water were stirred with glass rods first to ensure a representative sample was obtained from each drum. The three composite samples were each analyzed for ethylene glycol (WG-MG 1.2.3) and BOD (WG-EG 1.2.3).



Numbers indicate Navy Fuel Farm well of origin for each container.  
X = Unidentified Containers.  
EG/W indicates ethylene glycol/water containers.

Rows



Liquid w/less than 4" Residual Solids  
Solid w/less than 4" Liquid  
Solid/Liquid Combined

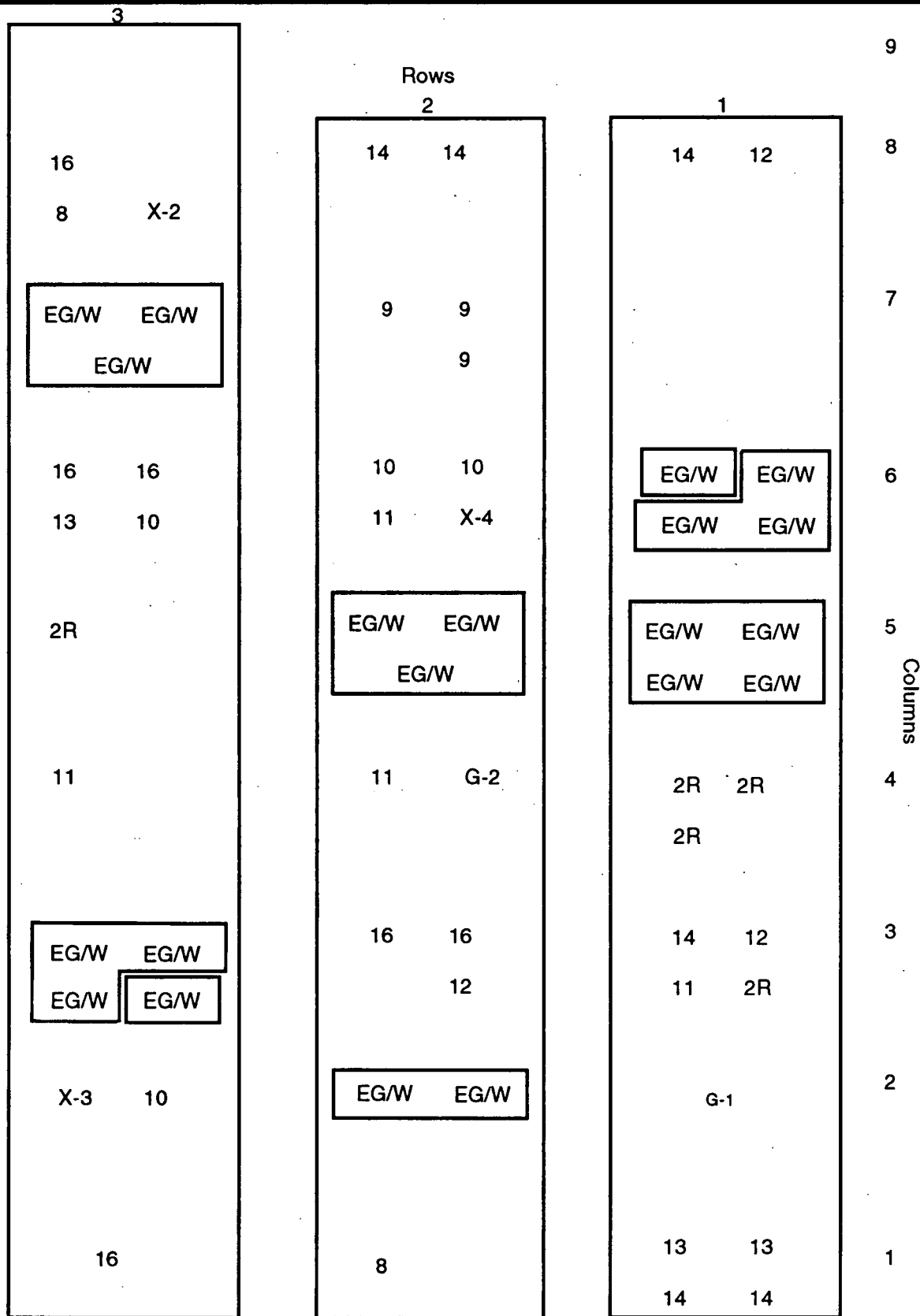
Figur 2-1. Initial inv ntory of containeriz d investigati n deriv d wastes (IDW) at Priv t Road sit .

TABLE 2-1 PRE-CONSOLIDATION INVENTORY OF CONTAINERIZED  
INVESTIGATION DERIVED WASTES (IDW) AT PRIVET ROAD SITE

<u>Group No.</u>	<u>Well No.</u>	<u>No. of Drums</u>	<u>Contents</u>
1	NFFW 9	10 4	Liquid Solid
1	NFFW 11	7 4	Liquid Solid
1	NFFW 12	1 3	Liquid Solid
2	NFFW 2R	1 6	Liquid Solid
2	NFFW 8	2	Solid
2	NFFW 13	1 3	Liquid Solid
2	NFFW 14	2 5	Liquid Solid
2	NFFW 16	2 5	Liquid Solid
2	X <sup>(a)</sup>	3 2	Liquid Solid
--	NFFW 10 <sup>(b)</sup>	4	Unspecified
--	EG/W	20	Liquid
Total Liquid . . . . .			47
Total Solid . . . . .			34
Total . . . . .			85

(a) Unidentifiable drums from NFFWs.

(b) Samples not collected for laboratory analyses.



Numbers indicate Navy Fuel Farm well of origin for each container.  
X = Unidentified Containers.

EG/W indicates ethylene glycol/water containers  
G = Group Consolidation Drums

Figure 2-2. Final inventory of containers identified investigation derived wastes (IDW) at Privat Road site.



TABLE 2-2 FINAL CONSOLIDATION INVENTORY OF CONTAINERIZED  
INVESTIGATION DERIVED WASTES (IDW) AT PRIVET ROAD SITE

<u>Group No.</u>	<u>Well No.</u>	<u>No. of Drums</u>	<u>Contents</u>
1	NFFW 9	3	Solid
1	NFFW 11	4	Solid
1	NFFW 12	3	Solid
1	G <sup>(b)</sup>	1	Solid
2	NFFW 2R	5	Solid
2	NFFW 8	2	Solid
2	NFFW 13	3	Solid
2	NFFW 14	6	Solid
2	NFFW 16	6	Solid
2	X <sup>(a)</sup>	3	Solid
2	G <sup>(b)</sup>	1	Solid
--	NFFW 10 <sup>(c)</sup>	4	Unspecified
--	EG/W	20	Liquid

Total Liquid . . . . . 20

Total Solid . . . . . 37

Total . . . . . 61

(a) Unidentifiable drums from NFFWs.

(b) Group 1 and 2 consolidation drums.

(c) Samples not collected for laboratory analyses.

### 3. ANALYTICAL RESULTS

#### 3.1 SOLID WASTE

##### 3.1.1 TCLP VOC

Table 3-1 summarizes the VOC detected in the leachate from samples WG1-DS and WG2-DS. The full list of analyses and the methods used for TCLP analysis are shown in Tables A-1 and A-2 in Appendix A. Sample WG1-DS extract contained only methylene chloride at an estimated 2  $\mu\text{g/L}$ . Methylene chloride was also detected in the TCLP extract blank at 10  $\mu\text{g/L}$ , which allows the methylene chloride detection in WG1-DS to be disregarded under the "five and ten" rule covering common laboratory contaminants.

Sample WG2-DS extract contained the following VOC: acetone 81  $\mu\text{g/L}$ ; toluene 48  $\mu\text{g/L}$ ; ethylbenzene 20  $\mu\text{g/L}$ ; xylenes 78  $\mu\text{g/L}$ ; and methylene chloride 45  $\mu\text{g/L}$ . Note that under the "five and ten" rule, methylene chloride can also be eliminated from consideration.

##### 3.1.2 TCLP SVOC

No semivolatile organic compounds were detected in either sample.

##### 3.1.3 TCLP Metals

Table 3-2 shows the analytical results for TCLP extracted metals analysis of each sample. Only barium, chromium, and silver were detected in the leachate; all other metals tested for were not present above detection limits. Barium and chromium were higher in extract from WG1-DS than from WG2-DS (3,530/2,120  $\mu\text{g/L}$  and 20.4/8.3  $\mu\text{g/L}$ , respectively). Silver concentrations were comparable at 4.0  $\mu\text{g/L}$  in Sample WG1-DS and 4.3  $\mu\text{g/L}$  in sample WG2-DS.

#### 3.1.4 TCLP Pesticides/PCB

The pesticide heptachlor was detected in the extract from sample WG2-DS (Table 3-1) at a concentration of 0.16  $\mu\text{g/L}$ . This is at the detection limit for the analytical method used. No pesticides were detected in sample extract from WG1-DS.

#### 3.1.5 Other TCLP Criteria

Tests for corrosivity, ignitability, and reactivity were all negative for both samples WG1-DS and WG2-DS. Results are summarized in Table 3-3.

#### 3.1.6 Total Petroleum Hydrocarbons (TPH)

TPH of samples WG1-DS and WG2-DS were 814 and 3,250 mg/kg, respectively. These results are shown on Table 3-3.

### 3.2 LIQUID WASTE

Table 3-4 summarizes the analytical results of sampling for drums containing mixed ethylene glycol/water wastes. Ethylene glycol concentrations were consistent at levels ranging from 1.18-1.41 percent. BOD values ranged more widely from a low of 1,160 mg/L to a high of 10,500 mg/L.

TABLE 3-1 VOC AND PESTICIDE SUMMARY RESULTS ( $\mu\text{g/L}$ )

<u>Sample ID</u>	<u>Meth. Chl.</u>	<u>Acetone</u>	<u>Toluene</u>	<u>E-Benzene</u>	<u>Xylenes</u>	<u>Heptachlor</u>
WG1-DS	2J					
WG2-DS	45	81	48	20	78	0.16*
TBLK (VOA)**	10					

\* Detection threshold.

\*\* Extraction blank.

TABLE 3-2 RESULTS FOR THE DETERMINATION OF EXTRACTED METALS FOR  
TWO SOIL SAMPLES COLLECTED FOR WILLOW GROVE NAS ON 21  
AND 22 APRIL 1992

<u>Parameter</u>	<u>Units</u>	<u>WG1-DS</u>	<u>WG2-DS</u>
Arsenic, Extracted	$\mu\text{g/L}$	<54.0	<54.0
Barium, Extracted	$\mu\text{g/L}$	3530	2120
Cadmium, Extracted	$\mu\text{g/L}$	<4.0	<4.0
Chromium, Extracted	$\mu\text{g/L}$	20.4	8.3
Lead, Extracted	$\mu\text{g/L}$	<100	<100
Mercury, Extracted	$\mu\text{g/L}$	<0.2	<0.2
Selenium, Extracted	$\mu\text{g/L}$	<27.0	<27.0
Silver, Extracted	$\mu\text{g/L}$	4.0	4.3
Accession Number		3034	3035

TABLE 3-3 RESULTS OF ANALYSIS OF TWO SOIL SAMPLES COLLECTED FOR  
WILLOW GROVE NAS ON 21 AND 22 APRIL 1992

<u>Parameter</u>	<u>Units</u>	<u>WG1-DS</u>	<u>WG2-DS</u>
Corrosivity	pH Units	8.0	7.6
Cyanide, Releasable	mg/kg (dry)	<0.16	<0.15
Hydrocarbons, Total	mg/kg (dry)	814	3250
Ignitable	None	No	No
Reactive	None	No	No
Sulfide, Releasable	mg/kg (dry)	12.4	17.0
Accession Number		3034	3035

TABLE 3-4 ETHYLENE GLYCOL AND BOD ANALYTICAL RESULTS

<u>Sample Designation</u>	<u>Ethylene Glycol (mg/L)</u>
WG-MG-1	(1.18 %)
WG-MG-2	(1.41 %)
WG-MG-3	(1.2 %)
	<u>BOD (mg/L)</u>
WG-EG-1	1,160
WG-EG-2	8,690
WG-EG-3	10,500

**TCLP Hazardous Toxicants with Regulatory Levels  
under Toxicity Characteristic Rule (TC) and  
Land Disposal Restrictions (LDR)**

Parameter	TC Rule Regulatory Level (mg/L, TCLP)	LDR Regulatory Level for wastewaters containing F001-F005 <sup>(a)</sup> spent solvents (mg/L, TCLP)	LDR Regulatory Level for all other F001-F005 <sup>(a)</sup> spent solvent wastes (mg/L, TCLP)
<b>Volatiles, extracted</b>			
Acetone	-	0.05	0.59
Benzene	0.5	0.5	-
n-Butanol	-	5.0	5.0
Carbon disulfide	-	1.05	4.81
Carbon tetrachloride	0.5	0.5	0.96
Chlorobenzene	100.0	0.15	0.05
Chloroform	6.0	-	-
1,2-Dichloroethane	0.5	-	-
1,1-Dichloroethene	0.7	-	-
Ethylbenzene	-	0.05	0.053
Ethyl acetate	-	0.05	0.75
Ethyl ether	-	0.05	0.75
Isobutanol	-	5.0	5.0
Methanol	-	0.25	0.75
Methylene chloride	-	0.20	0.96
Methyl ethyl ketone	200.0	0.05	0.75
Methyl isobutyl ketone	-	0.05	0.33
Tetrachloroethene	0.7	0.79	0.05
Toluene	-	1.12	0.33
1,1,1-Trichloroethane	-	1.05	0.41
Trichloroethene	0.5	0.062	0.091
Trichlorofluoromethane	-	0.05	0.96
1,1,2-Trichloro-1,2,2- trifluoroethane	-	1.05	0.96
Vinyl chloride	0.2	-	-
Xylenes	-	0.05	0.15
<b>Herbicides, extracted</b>			
2,4-D	10.0	-	-
2,4,5-TP	1.0	-	-
<b>Pesticides, extracted</b>			
Chlordane	0.03	-	-
γ-BHC (Lindane)	0.4	-	-
Endrin	0.02	-	-
Heptachlor (and its oxides)	0.008	-	-
Methoxychlor	10.0	-	-
Toxaphene	0.5	-	-



**TCLP Hazardous Toxicants with Regulatory Levels  
under Toxicity Characteristic Rule (TC) and  
Land Disposal Restrictions (LDR)**

Parameter	TC Rule Regulatory Level (mg/L, TCLP)	LDR Regulatory Level for wastewaters containing F001-F005 <sup>(a)</sup> spent solvents (mg/L, TCLP)	LDR Regulatory Level for all other F001-F005 <sup>(a)</sup> spent solvent wastes (mg/L, TCLP)
<b>Semivolatiles, extracted</b>			
Cyclohexanone	-	0.125	0.75
1,2-Dichlorobenzene	-	0.65	0.125
1,4-Dichlorobenzene	7.5	-	-
2,4-Dinitrotoluene	0.13	-	-
Hexachlorobenzene	0.13	-	-
Hexachlorobutadiene	0.5	-	-
Hexachloroethane	3.0	-	-
2-Methylphenol	200.0	2.82	0.75
3-Methylphenol	200.0	2.82	0.75
4-Methylphenol	200.0	2.82	0.75
Nitrobenzene	2.0	0.66	0.125
Pentachlorophenol	100.0	-	-
Pyridine	5.0	1.12	0.33
2,4,5-Trichlorophenol	400.0	-	-
2,4,6-Trichlorophenol	2.0	-	-
<b>Metals, extracted</b>			
Arsenic	5.0	(b)	(b)
Barium	100.0	(b)	(b)
Cadmium	1.0	(b)	(b)
Chromium	5.0	(b)	(b)
Lead	5.0	(b)	(b)
Mercury	0.2	(b)	(b)
Selenium	1.0	(b)	(b)
Silver	5.0	(b)	(b)

(a) EPA hazardous waste codes from non-specific sources (40 CFR 261).

(b) Treatment standards for metals compounds vary depending on the RCRA waste code (40 CFR 268.1).

## 4. CONCLUSIONS AND RECOMMENDATIONS

### 4.1 CONCLUSIONS

#### 4.1.1 Solid Waste

A primary goal of this study was to characterize the soil from the IDW drums at Privet Road to determine if it was hazardous and to recommend disposal options. Hazardous status is determined by analysis of representative samples of the waste for toxicity (TCLP) corrosivity, ignitability and reactivity. Disposal options are also constrained by the Land Disposal Regulations which may prohibit a waste from being landfilled regardless of hazardous status. Table 4-1 shows the regulatory limits for determination of toxicity as regards to hazardous status using TCLP and the limits imposed by the LDR for land disposal. Corrosivity is defined as pH levels less than 2 or greater than 12. Ignitability and Reactivity are determined in the laboratory as either yes or no.

Comparison of the analytical results obtained for soil from drum group WG1-DS with the above cited regulatory criteria shows that the soil is non hazardous and acceptable for land disposal. Under Pennsylvania municipal solid waste management regulations (Penn. Code Title 25, Chap. 273) and virgin fuel contaminated soil guidelines published by the Pennsylvania Department of Environment Resources (PADER, 1990 and 1991), the origin of the contamination and the TPH level (814 mg/kg) in excess of 100 mg/kg will cause the State to classify the soil from Group WG1-DS as residual waste. Fuel-contaminated residual waste should be disposed at a lined landfill facility permitted to receive residual waste. Since the quantity is less than 25 tons, no reporting requirements for analytical data are required by the State (PADER, 1990), but individual landfill facilities may have additional reporting requirements prior to acceptance of the material for disposal.

Comparison of the analytical results obtained for soil from drum Group WG2-DS with the above cited regulatory criteria shows that the soil is non hazardous and acceptable for land disposal. As with Group WG1-DS, the TPH values for soil in Group WG2-DS (3,250 mg/kg) exceeds 100 mg/kg and this soil must be considered residual waste. The same disposal criteria cited above apply to soil from drum group WG2-DS.

#### 4.1.2 Liquid Waste

A second objective of this study was to assess the ethylene glycol content of the water collected from the ethylene glycol release detected at the Antenna Field Landfill site. Analytical results show that the average concentration of ethylene glycol is 1.26% with BOD values ranging from 1,160-10,500 mg/L. This ethylene glycol/water mixed liquid waste contains too low a percentage of ethylene glycol to recycle but too high a percentage of ethylene glycol to discharge to the environment, based on the BOD values. This liquid waste should be treated in some way prior to disposal.

#### 4.2 RECOMMENDATIONS

Based on the results of chemical analyses for the composite samples collected from the drums of IDW stored at Privet Road Compound, EA recommends the following disposal options:

- Soil from sample group WG1-DS was determined to be non hazardous. It should be disposed at a lined landfill permitted to receive fuel-contaminated residual waste by a licensed hauler in accordance with all applicable state and federal regulations. This includes drums labeled NFFW-9, 11, 12, and G-1, a total of 11 drums. As an alternative, the soil could possibly be bioremediated

to reduce the TPH levels to those acceptable at a sanitary landfill, but the additional analytical costs incurred to confirm acceptability make this option less cost effective than disposal at a residual waste facility.

- Soil from sample group WG2-DS was also determined to be non hazardous. It should be disposed as above. This includes drums NFFW-2R, 8, 13, 14, 16, X, and G-2, a total of 26 drums. As with the previous group, bioremediation could be used to reduce TPH levels, but the analytical costs incurred to prove acceptability may make disposal at a lined landfill permitted to receive fuel-contaminated residual waste more cost effective.
- The water/ethylene glycol waste can be trickle-fed into the installation sewage treatment plant at a rate not to exceed 9 gal/hr, assuming that the plant operating permit will allow disposal of this non-hazardous waste. If the operating permit precludes this, then the waste may be disposed at an industrial waste water treatment facility or recycled if a buyer can be found.
- The three carbon canisters remaining onsite should be disposed as hazardous waste at an appropriate hazardous waste facility.
- The remaining half-full drum of hydrocarbon product should be recycled if possible or the fuel incinerated.
- The four drums of methanol should be removed from the Privet Road Compound and stored at a solvent storage area for eventual use.

- The soil in drums labeled NFFW-10 should be regarded as clean fill and may be disposed by base personnel.

## REFERENCES

Pennsylvania Municipal Waste Management Regulations. Pennsylvania Code Title 25.  
1991. Chap. 273, pg 1291: 1026-1049.

Policy and Procedure For the Disposal of Fuel-Contaminated Soils. 1990. pg. 1-7,  
PADER.

Protective Levels and Criteria for the Excavation, Treatment, Cleanup, and Disposal of  
Virgin Fuel Contaminated Soil. 1991. pg. 1-7, PADER.

APPENDIX A  
ANALYTICAL DATA

TCLP

[illegible]



TABLE A-2 ANALYTICAL METHODS

<u>Parameter</u>	<u>Method</u>	<u>Method Number</u>	<u>Matrix</u>
<b>SAMPLE PREPARATION</b>			
Metals Digestion	Nitric Acid - Hydrogen Peroxide	3050	SO
Oil & Grease Extraction	Soxhlet Extraction	9071	SO
Releasable Cyanide	Acidification, Nitrogen Purge	§7.3.3.2	SO
Releasable Sulfide	Acidification, Nitrogen Purge	§7.3.4.2	SO
Toxicity Characteristic Leaching Procedure (TCLP)	Liquid Extraction	1311	W,SO
<b>ORGANICS</b>			
Acid Extractable Organic Compounds	Gas Chromatography/Mass Spectrometry	8270	W,SO
Base-Neutral Extractable Organic Compounds	Gas Chromatography/Mass Spectrometry	8270	W,SO
Biochemical Oxygen Demand	BOD (5 day, 20C)	405.1	W
Ethylene Glycol	Gas Chromatography - FID	3580/8100-M	W,SO
Halogenated Hydrocarbon Pesticides	Gas Chromatography - ECD	3520/3540/ 8080	W,SO
Methanol	Gas Chromatography - FID California Method	8015-M	W,SO
Phenoxy Acid Herbicides	Gas Chromatography - ECD	8150	W,SO
Total Petroleum Hydrocarbons	Spectrophotometric - Infrared after Soxhlet extraction (SW846 9071)	418.1	SO
Volatile Organic Compounds	Gas Chromatography/Mass Spectrometry	8240	W,SO

TABLE A-2 (Cont.)

<u>Parameter</u>	<u>Method</u>	<u>Method Number</u>	<u>Matrix</u>
<b>METALS</b>			
Arsenic	Atomic Emission - ICP	6010	W,SO
Barium	Atomic Emission - ICP	6010	W,SO
Cadmium	Atomic Emission - ICP	6010	W,SO
Chromium, Total	Atomic Emission - ICP	6010	W,SO
Lead	Atomic Emission - ICP	6010	W
Mercury	Atomic Adsorption - Cold Vapor	7470	W
Selenium	Atomic Emission - ICP	6010	W,SO
Silver	Atomic Emission - ICP	6010	SO
<b>PHYSICAL DETERMINATIONS</b>			
Ignitability (Solid)	Regulatory Definition	§7.1	SO
Corrosivity (Solid)	pH Measurement (1+1 solid and water)	9040	SO
Reactivity (Solid)	Reaction Over pH Range 2-12, (1+1 solid and water)	§7.3	SO

## Matrix Codes:

A - Air.

W - Estuarine water, ground water, leachates, ocean water, surface water, and wastewater.

DW - Drinking water.

SO - Soils, sludges, sediments, and wastes.

T - Animal tissue, plant tissue.

LABORATORY DATA REPORT

Prepared for:

Willow Grove NAS

Prepared by:

EA Laboratories  
19 Loveton Circle  
Sparks, Maryland 21152

May 1992

EA Laboratories  
ANALYTICAL NARRATIVE

Client: Willow Grove NAS  
Project number: 10388.06

Laboratory Project Manager: Joanne Heffleger  
EA Laboratories Report: 920502  
Date: 14 May 1992

---

This report contains the results of the analysis of two soil and three water samples collected on 21 through 23 April 1992 in support of the referenced project. The samples arrived handcarried and intact at EA Laboratories on 23 April 1992. Upon receipt, the samples were inspected, compared with the chain-of-custody record, logged into the laboratory computer system with assigned laboratory accession numbers, and released for analysis. No trip blank was ever received. Table 1 lists the analytical methods used.

<u>Client Sample Name</u>	<u>EA Lab Number</u>
WG1-DS	3034
WG2-DS	3035
WG-MG-1	3036
WG-MG-2	3037
WG-MG-3	3038

Results are reported in Tables 2 through 4, and in the Form I's which follow.

Quality Control

This section summarizes the general quality control activities performed by the laboratory which relate to laboratory method performance, sample matrix effects, and field quality control samples. Quality control samples specified by the project and in the analytical methods are analyzed and reported as required, and the data are validated by analyst, staff, and supervisor review.

EA Laboratories  
ANALYTICAL NARRATIVE

Client: Willow Grove NAS  
Project number: 10388.06

Laboratory Project Manager: Joanne Heffleger  
EA Laboratories Report: 920502  
Date: 13 May 1992

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Laboratory method performance: All quality control criteria for method performance must be met for data to be reported. These criteria generally apply to instrument tune, calibration, method blanks, and Laboratory Control Samples (LCS).

Sample matrix effects: Quality control samples are analyzed to determine any measurement bias due to the sample, and may include matrix spikes (MS), matrix spike duplicates (MSD), and laboratory duplicates (D). If criteria are not met, matrix interferences are confirmed either by reanalysis or by inspection of the LCS results to verify that laboratory method performance is in control. Data are reported with appropriate qualifiers or discussion.

Field quality control samples: Field duplicates, trip blanks, and rinsate blanks are used to evaluate field quality control. Unless specific laboratory performance criteria and corrective actions are identified in the project requirements, results are reported after routine laboratory data validation.

**General Chemistry**

All quality control met the EA standard criteria with the following exceptions:

- (1) The recovery of the LCS for releaseable cyanide is outside the control limits. The sample results are below the detection limit and well below the regulatory limit.
- (2) Sample dilutions for the BOD analysis were chosen based on sample appearance and odor. EA Sample numbers 3036-3038 were overdiluted (no oxygen depletion for any

EA Laboratories  
ANALYTICAL NARRATIVE

Client: Willow Grove NAS  
Project number: 10388.06

Laboratory Project Manager: Joanne Heffleger  
EA Laboratories Report: 920502  
Date: 13 May 1992

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of the dilutions). The concentration of the smallest dilution is reported as a less than (<) value. The analysis can not be repeated due to holding time restrictions.

**Semivolatiles**

Both samples for this project had low recoveries for all acid surrogates. EA sample number 3034 was analyzed as MS/MSD and TCLPMS. All acid surrogates were out in these analyses also. All blanks and LCSs had excellent surrogate recovery, therefore matrix affect is assumed.

**Certification of Results**

The Laboratory certifies that this report meets the project requirements for analytical data as stated in the Analytical Task Order (ATO) and the chain-of-custody. In addition, the Laboratory certifies that the data as reported meet the Data Quality Objectives for precision, accuracy, and completeness specified for this project or as stated in EA Laboratories Quality Assurance program for other than the conditions detailed above.

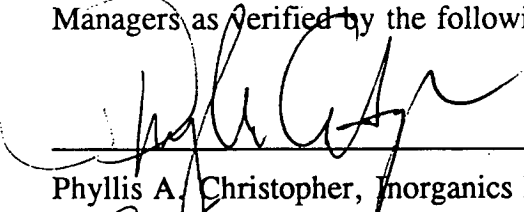
EA Laboratories  
ANALYTICAL NARRATIVE

Client: Willow Grove NAS  
Project number: 10388.06

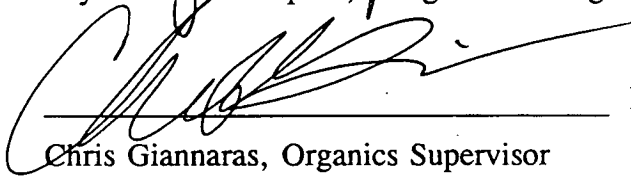
Laboratory Project Manager: Joanne Heffleger  
EA Laboratories Report: 920502  
Date: 13 May 1992

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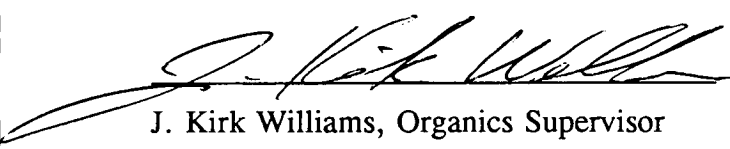
Release of the data contained in this report has been authorized by the appropriate Laboratory Managers as verified by the following signatures.

  
\_\_\_\_\_  
Phyllis A. Christopher, Inorganics Manager

May 13, 1992

  
\_\_\_\_\_  
Chris Giannaras, Organics Supervisor

May 13, 1992

  
\_\_\_\_\_  
J. Kirk Williams, Organics Supervisor

May 13, 1992

TABLE 1. ANALYTICAL METHODS

Page 1 of 3

Parameter	Method	Method Number	Matrix	Reference
SAMPLE PREPARATION				
Metals Digestion	Nitric Acid - Hydrogen Peroxide	3050	SO	(3)
Oil & Grease Extraction	Soxhlet Extraction	9071	SO	(3)
Releasable Cyanide	Acidification, Nitrogen Purge	§7.3.3.2	SO	(3)
Releasable Sulfide	Acidification, Nitrogen Purge	§7.3.4.2	SO	(3)
Toxicity Characteristic Leaching Procedure (TCLP)	Liquid Extraction	1311	W,SO	(4)
ORGANICS				
Acid Extractable Organic Compounds	Gas Chromatography/Mass Spectrometry	8270	W,SO	(3)
Base-Neutral Extractable Organic Compounds	Gas Chromatography/Mass Spectrometry	8270	W,SO	(3)
Biochemical Oxygen Demand	BOD (5 day, 20C)	405.1	W	(2)
Ethylene Glycol	Gas Chromatography - FID	3580/8100-M	W,SO	(3)
Halogenated Hydrocarbon Pesticides	Gas Chromatography - ECD	3520/3540 8080	W,SO	(3)
Methanol	Gas Chromatography - FID California method	8015-M	W,SO	(1)
Phenoxy Acid Herbicides	Gas Chromatography - ECD	8150	W,SO	(3)
Total Petroleum Hydrocarbons	Spectrophotometric - Infrared after Soxhlet extraction (SW846 9071)	418.1	SO	(2)
Volatile Organic Compounds	Gas Chromatography/Mass Spectrometry	8240	W,SO	(3)



TABLE 1. ANALYTICAL METHODS

Page 2 of 3

Parameter	Method	Method Number	Matrix	Reference
METALS				
Arsenic	Atomic Emission - ICP	6010	W,SO	(3)
Barium	Atomic Emission - ICP	6010	W,SO	(3)
Cadmium	Atomic Emission - ICP	6010	W,SO	(3)
Chromium, Total	Atomic Emission - ICP	6010	W,SO	(3)
Lead	Atomic Emission - ICP	6010	W,SO	(3)
Mercury	Atomic Absorption - Cold Vapor	7470	W	(3)
Selenium	Atomic Emission - ICP	6010	W,SO	(3)
Silver	Atomic Emission - ICP	6010	W,SO	(3)
PHYSICAL DETERMINATIONS				
Ignitability (Solid)	Regulatory Definition	\$7.1	SO	(3)
Corrosivity (Solid)	pH Measurement (1+1 solid and water)	9040	SO	(3)
Reactivity (Solid)	Reaction Over pH Range 2-12, (1+1 solid and water)	\$7.3	SO	(3)

## Matrix codes:

A - Air  
W - Estuarine water, ground water, leachates, ocean water, surface water, and wastewater  
DW - Drinking water  
SO - Soils, sludges, sediments, wastes  
T - Animal tissue, plant tissue

TABLE 1. ANALYTICAL METHODS

Page 3 of 3

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References:

- (1) California State Water Resources Control Board. 1988. Draft Method for Total Petroleum Hydrocarbons and Total Organic Lead, in Leaking Underground Fuel Tank (LUFT) Field Manual. CSWRCB, San Francisco.
- (2) United States Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020. U.S. EPA, Cincinnati, Ohio.
- (3) United States Environmental Protection Agency. 1986. Test Methods for Evaluating Solid Waste. Physical/Chemical Methods. EPA SW-846, 3rd edition. U.S. EPA, Washington, D.C.
- (4) United States Environmental Protection Agency. 1990. Toxicity characteristic leaching procedure. Federal Register 55(126):26986-26998.

TABLE 2.  
RESULTS OF ANALYSIS OF TWO SOIL SAMPLES COLLECTED  
FOR WILLOW GROVE NAS ON 21 AND 22 APRIL 1992

Parameter	Units	WG1-DS	WG2-DS
Corrosivity	pH Units	8.0	7.6
Cyanide, Releasable	mg/kg (dry)	<0.16	<0.15
Hydrocarbons, Total	mg/kg (dry)	814	3250
Ignitable	None	No	No
Reactive	None	No	No
Sulfide, Releasable	mg/kg (dry)	12.4	17.0
Accession Number		3034	3035

TABLE 3.  
RESULTS FOR THE DETERMINATION OF EXTRACTED  
METALS FOR TWO SOIL SAMPLES COLLECTED FOR  
WILLOW GROVE NAS ON 21 AND 22 APRIL 1992

Parameter	Units	WG1-DS	WG2-DS
Arsenic, Extracted	ug/L	<54.0	<54.0
Barium, Extracted	ug/L	3530	2120
Cadmium, Extracted	ug/L	<4.0	<4.0
Chromium, Extracted	ug/L	20.4	8.3
Lead, Extracted	ug/L	<100	<100
Mercury, Extracted	ug/L	<0.2	<0.2
Selenium, Extracted	ug/L	<27.0	4.3
Silver, Extracted	ug/L	4.0	<27.0
Accession Number		3034	3035

TABLE 3.  
RESULTS FOR THE DETERMINATION OF EXTRACTED  
METALS FOR TWO SOIL SAMPLES COLLECTED FOR  
WILLOW GROVE NAS ON 21 AND 22 APRIL 1992

Parameter	Units	WG1-DS	WG2-DS
Arsenic, Extracted	ug/L	<54.0	<54.0
Barium, Extracted	ug/L	3530	2120
Cadmium, Extracted	ug/L	<4.0	<4.0
Chromium, Extracted	ug/L	20.4	8.3
Lead, Extracted	ug/L	<100	<100
Mercury, Extracted	ug/L	<0.2	<0.2
Selenium, Extracted	ug/L	<27.0	<27.0
Silver, Extracted	ug/L	4.0	4.3
Accession Number		3034	3035

**INDIVIDUAL DATA SHEETS**  
**Volatiles - 8240**

1A  
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

WG1-DS

Lab Name: EA LABS

Contract: WILLOW

Lab Code: EAENG

Case No:

SAS No.: \_\_\_\_\_

SDG No:

Matrix: (soil/water) WATER

Lab Sample ID: 3034

Sample wt/vol:

5 (g/mL) ML

Lab File ID: HA04035

Level: (low/med) LOW

Date Received: 04/23/92

% Moisture: not dec. \_\_\_\_\_

Date Analyzed: 04/28/92

GC Column: RTX502.2 ID: .53 (mm)

Dilution Factor: 1.0

Soil Extract Volume: \_\_\_\_\_ (uL)

Soil Aliquot Volume: \_\_\_\_\_ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg)	ug/L
75-01-4	VINYL CHLORIDE	10	U
75-09-2	METHYLENE CHLORIDE	2	J
67-64-1	ACETONE	10	U
75-15-0	CARBON DISULFIDE	5	U
75-69-4	TRICHLOROFLUOROMETHANE	5	U
76-13-1	1,1,2-TRICHLOROTRIFLUOROETHA	5	U
75-35-4	1,1-DICHLOROETHENE	5	U
67-66-3	CHLOROFORM	5	U
107-06-2	1,2-DICHLOROETHANE	5	U
78-93-3	2-BUTANONE (MEK)	100	U
60-29-7	ETHYL ETHER	5	U
141-78-6	ETHYL ACETATE	5	U
71-55-6	1,1,1-TRICHLOROETHANE	5	U
56-23-5	CARBON TETRACHLORIDE	5	U
79-01-6	TRICHLOROETHENE	5	U
71-43-2	BENZENE	5	U
108-10-1	4-METHYL-2-PENTANONE (MIBK)	10	U
127-18-4	TETRACHLOROETHENE	5	U
108-88-3	TOLUENE	5	U
108-90-7	CHLOROBENZENE	5	U
100-41-4	ETHYLBENZENE	5	U
1330-20-7	XYLENES (TOTAL)	5	U

1A  
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

WG2-DS

Lab Name: EA LABS

Contract: WILLOW

Lab Code: EAENG

Case No:

SAS No.: \_\_\_\_\_

SDG No:

Matrix: (soil/water) WATER

Lab Sample ID: 3035

Sample wt/vol: 5 (g/mL) ML

Lab File ID: HA04036

Level: (low/med) LOW

Date Received: 04/23/92

% Moisture: not dec. \_\_\_\_\_

Date Analyzed: 04/28/92

GC Column: RTX502.2 ID: .53 (mm)

Dilution Factor: 1.0

Soil Extract Volume: \_\_\_\_\_ (uL)

Soil Aliquot Volume: \_\_\_\_\_ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg)ug/L	Q
75-01-4-----	VINYL CHLORIDE_____	10	U
75-09-2-----	METHYLENE CHLORIDE_____	45	
67-64-1-----	ACETONE_____	81	
75-15-0-----	CARBON DISULFIDE_____	5	U
75-69-4-----	TRICHLOROFLUOROMETHANE_____	5	U
76-13-1-----	1,1,2-TRICHLOROTRIFLUOROETHA_____	5	U
75-35-4-----	1,1-DICHLOROETHENE_____	5	U
67-66-3-----	CHLOROFORM_____	5	U
107-06-2-----	1,2-DICHLOROETHANE_____	5	U
78-93-3-----	2-BUTANONE (MEK)_____	100	U
60-29-7-----	ETHYL ETHER_____	5	U
141-78-6-----	ETHYL ACETATE_____	5	U
71-55-6-----	1,1,1-TRICHLOROETHANE_____	5	U
56-23-5-----	CARBON TETRACHLORIDE_____	5	U
79-01-6-----	TRICHLOROETHENE_____	5	U
71-43-2-----	BENZENE_____	5	U
108-10-1-----	4-METHYL-2-PENTANONE (MIBK)_____	10	U
127-18-4-----	TETRACHLOROETHENE_____	5	U
108-88-3-----	TOLUENE_____	48	
108-90-7-----	CHLOROBENZENE_____	5	U
100-41-4-----	ETHYLBENZENE_____	20	
1330-20-7-----	XYLENES (TOTAL)_____	78	



1A  
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

VBLK

Lab Name: EA LABS

Contract: WILLOW

Lab Code: EAENG

Case No:

SAS No.: \_\_\_\_\_

SDG No:

Matrix: (soil/water) WATER

Lab Sample ID: 0

Sample wt/vol: 5 (g/mL) ML

Lab File ID: HA04031

Level: (low/med) LOW

Date Received: / /

% Moisture: not dec. \_\_\_\_\_

Date Analyzed: 04/28/92

GC Column: RTX502.2 ID: .53 (mm)

Dilution Factor: 1.0

Soil Extract Volume: \_\_\_\_\_ (uL)

Soil Aliquot Volume: \_\_\_\_\_ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg)	ug/L
75-01-4-----	VINYL CHLORIDE	10	U
75-09-2-----	METHYLENE CHLORIDE	5	U
67-64-1-----	ACETONE	10	U
75-15-0-----	CARBON DISULFIDE	5	U
75-69-4-----	TRICHLOROFLUOROMETHANE	5	U
76-13-1-----	1,1,2-TRICHLOROTRIFLUOROETHA	5	U
75-35-4-----	1,1-DICHLOROETHENE	5	U
67-66-3-----	CHLOROFORM	5	U
107-06-2-----	1,2-DICHLOROETHANE	5	U
78-93-3-----	2-BUTANONE (MEK)	100	U
60-29-7-----	ETHYL ETHER	5	U
141-78-6-----	ETHYL ACETATE	5	U
71-55-6-----	1,1,1-TRICHLOROETHANE	5	U
56-23-5-----	CARBON TETRACHLORIDE	5	U
79-01-6-----	TRICHLOROETHENE	5	U
71-43-2-----	BENZENE	5	U
108-10-1-----	4-METHYL-2-PENTANONE (MIBK)	10	U
127-18-4-----	TETRACHLOROETHENE	5	U
108-88-3-----	TOLUENE	5	U
108-90-7-----	CHLOROBENZENE	5	U
100-41-4-----	ETHYLBENZENE	5	U
1330-20-7-----	XYLENES (TOTAL)	5	U

1A  
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

TBLK

Lab Name: EA LABS

Contract: WILLOW

Lab Code: EAENG

Case No:

SAS No.: \_\_\_\_\_

SDG No:

Matrix: (soil/water) WATER

Lab Sample ID: 643

Sample wt/vol: 5 (g/mL) ML

Lab File ID: HA04034

Level: (low/med) LOW

Date Received: 04/23/92

% Moisture: not dec. \_\_\_\_\_

Date Analyzed: 04/28/92

GC Column: RTX502.2 ID: .53 (mm)

Dilution Factor: 1.0

Soil Extract Volume: \_\_\_\_\_ (uL)

Soil Aliquot Volume: \_\_\_\_\_ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg)ug/L	Q
75-01-4-----	VINYL CHLORIDE_____	10	U
75-09-2-----	METHYLENE CHLORIDE_____	10	
67-64-1-----	ACETONE_____	10	U
75-15-0-----	CARBON DISULFIDE_____	5	U
75-69-4-----	TRICHLOROFLUOROMETHANE_____	5	U
76-13-1-----	1,1,2-TRICHLOROTRIFLUOROETHA_____	5	U
75-35-4-----	1,1-DICHLOROETHENE_____	5	U
67-66-3-----	CHLOROFORM_____	5	U
107-06-2-----	1,2-DICHLOROETHANE_____	5	U
78-93-3-----	2-BUTANONE (MEK)_____	100	U
60-29-7-----	ETHYL ETHER_____	5	U
141-78-6-----	ETHYL ACETATE_____	5	U
71-55-6-----	1,1,1-TRICHLOROETHANE_____	5	U
56-23-5-----	CARBON TETRACHLORIDE_____	5	U
79-01-6-----	TRICHLOROETHENE_____	5	U
71-43-2-----	BENZENE_____	5	U
108-10-1-----	4-METHYL-2-PENTANONE (MIBK)_____	10	U
127-18-4-----	TETRACHLOROETHENE_____	5	U
108-88-3-----	TOLUENE_____	5	U
108-90-7-----	CHLOROBENZENE_____	5	U
100-41-4-----	ETHYLBENZENE_____	5	U
1330-20-7-----	XYLENES (TOTAL)_____	5	U

**INDIVIDUAL DATA SHEETS**  
**Methanol - 8015-M**

1  
TCLP METHANOL ANALYSIS DATA SHEET

CLIENT SAMPLE ID

Lab Name: EA LABORATORIES	Contract: _____	WG1-DS
Lab Code: EAENG	Case #: _____	SAS #: _____
		SDG No.: WG1-DS
Matrix: (soil/water)	TCLP WATER	Lab Sample ID: 3034
Sample wt/vol: 200 mL		Lab File ID: 012F0101.D
Level: (low/med)	LOW	Date Received: 23 APR 92
% Moisture: N/A		Date Extracted: 24 APR 92
Extraction: TCLP		Date Analyzed: 27 APR 92
GPC Cleanup:(Y/N) N/A	pH: N/A	17:13
		Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS:	mg/L
_____	METHANOL	< 10.000	Q

1  
TCLP METHANOL ANALYSIS DATA SHEET

CLIENT SAMPLE ID

Lab Name: EA LABORATORIES	Contract: _____	WG2-DS
Lab Code: EAENG	Case #: _____	SAS #: _____
	SDG No.:	WG1-DS
Matrix: (soil/water)	TCLP WATER	Lab Sample ID: 3035
Sample wt/vol:	200 mL	Lab File ID: 013F0101.D
Level: (low/med)	LOW	Date Received: 23 APR 92
% Moisture:	N/A	Date Extracted: 24 APR 92
Extraction:	TCLP	Date Analyzed: 27 APR 92
		17:35
GPC Cleanup:(Y/N)	N/A	pH: N/A
		Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS:	mg/L
_____	METHANOL	< 10.000	U

1  
TCLP METHANOL ANALYSIS DATA SHEET

CLIENT SAMPLE ID

Lab Name: EA LABORATORIES Contract: \_\_\_\_\_

INSTRUMENT BLANK

Lab Code: EAENG Case #: \_\_\_\_\_ SAS #: \_\_\_\_\_ SDG No.: WG1-DS

Matrix: (soil/water) TCLP WATER Lab Sample ID: IBLK #1

Sample wt/vol: 200 mL Lab File ID: 010F0101.D

Level: (low/med) LOW Date Received: N/A

% Moisture: N/A Date Extracted: N/A

Extraction: TCLP Date Analyzed: 27 APR 92  
16:29

GPC Cleanup:(Y/N) N/A pH: N/A Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS:	mg/L Q
	METHANOL	< 10.000	U

1  
TCLP METHANOL ANALYSIS DATA SHEET

CLIENT SAMPLE ID

Lab Name: EA LABORATORIES

Contract: \_\_\_\_\_

METHOD BLANK

Lab Code: EAENG

Case #: \_\_\_\_\_

SAS #: \_\_\_\_\_

SDG No.: WG1-DS

Matrix: (soil/water)

TCLP WATER

Lab Sample ID: TBLK 643

Sample wt/vol:

200 mL

Lab File ID: 011F0101.D

Level: (low/med)

LOW

Date Received: N/A

% Moisture:

N/A

Date Extracted: 24 APR 92

Extraction:

TCLP

Date Analyzed: 27 APR 92

16:51

GPC Cleanup:(Y/N) N/A

pH: N/A

Dilution Factor: 1

CAS NO.

COMPOUND

CONCENTRATION UNITS:

mg/L  
Q

METHANOL

< 10.000

U

EA Laboratories  
ANALYTICAL NARRATIVE

Client: Willow Grove NAS  
Project number: 10388.06

Laboratory Project Manager: Joanne Heffleger  
EA Laboratories Report: 920502  
Date: 18 May 1992

---

This report contains the results of the analysis of two soil and three water samples collected on 21 through 23 April 1992 in support of the referenced project. The samples arrived handcarried and intact at EA Laboratories on 23 April 1992. Upon receipt, the samples were inspected, compared with the chain-of-custody record, logged into the laboratory computer system with assigned laboratory accession numbers, and released for analysis. Table 1 lists the analytical methods used.

<u>Client Sample Name</u>	<u>EA Lab Number</u>
WG1-DS	3034
WG2-DS	3035
WG-MG-1	3036
WG-MG-2	3037
WG-MG-3	3038

Results are reported in Tables 2 and 3 and in the Form I's which follow.

Quality Control

This section summarizes the general quality control activities performed by the laboratory which relate to laboratory method performance, sample matrix effects, and field quality control samples. Quality control samples specified by the project and in the analytical methods are analyzed and reported as required, and the data are validated by analyst, staff, and supervisor review.



EA Laboratories  
ANALYTICAL NARRATIVE

Client: Willow Grove NAS  
Project number: 10388.06

Laboratory Project Manager: Joanne Heffleger  
EA Laboratories Report: 920502  
Date: 18 May 1992

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Laboratory method performance: All quality control criteria for method performance must be met for data to be reported. These criteria generally apply to instrument tune, calibration, method blanks, and Laboratory Control Samples (LCS).

Sample matrix effects: Quality control samples are analyzed to determine any measurement bias due to the sample, and may include matrix spikes (MS), matrix spike duplicates (MSD), and laboratory duplicates (D). If criteria are not met, matrix interferences are confirmed either by reanalysis or by inspection of the LCS results to verify that laboratory method performance is in control. Data are reported with appropriate qualifiers or discussion.

Field quality control samples: Field duplicates, trip blanks, and rinsate blanks are used to evaluate field quality control. Unless specific laboratory performance criteria and corrective actions are identified in the project requirements, results are reported after routine laboratory data validation.

**Semivolatiles**

Both samples for this project had low recoveries for all acid surrogates. Sample #3034 was analyzed as MS/MSD and TCLPMS. All acid surrogates were out in these analyses also. The MS/MSD were extracted on a different day than the original analysis, and all blanks and LCSs had excellent surrogate recovery, therefore matrix affect is assumed.

EA Laboratories  
ANALYTICAL NARRATIVE

Client: Willow Grove NAS  
Project number: 10388.06

Laboratory Project Manager: Joanne Heffleger  
EA Laboratories Report: 920502  
Date: 18 May 1992

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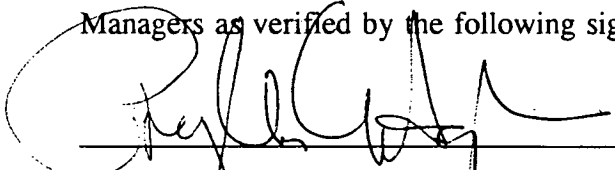
Alcohols

The analysis for 1-Butanol and 2-Butanol were run six days outside of holding time. The project manager was notified and the results are included.

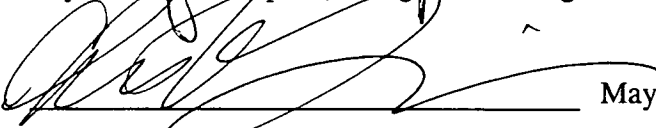
Certification of Results

The Laboratory certifies that this report meets the project requirements for analytical data as stated in the Analytical Task Order (ATO) and the chain-of-custody. In addition, the Laboratory certifies that the data as reported meet the Data Quality Objectives for precision, accuracy, and completeness specified for this project or as stated in EA Laboratories Quality Assurance program for other than the conditions detailed above.

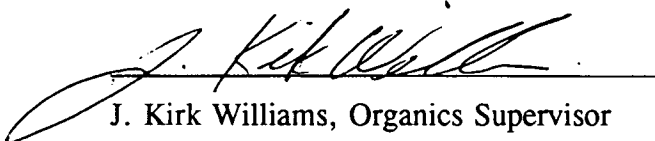
Release of the data contained in this report has been authorized by the appropriate Laboratory Managers as verified by the following signatures.

  
\_\_\_\_\_  
Phyllis A. Christopher, Inorganics Manager

May 18, 1992

  
\_\_\_\_\_  
Chris Giannaras, Organics Supervisor

May 18, 1992

  
\_\_\_\_\_  
J. Kirk Williams, Organics Supervisor

May 18, 1992

TABLE 1. ANALYTICAL METHODS

Page 1 of 3

Parameter	Method	Method Number	Matrix	Reference
SAMPLE PREPARATION				
Metals Digestion	Nitric Acid - Hydrogen Peroxide	3050	SO	(3)
Oil & Grease Extraction	Soxhlet Extraction	9071	SO	(3)
Releasable Cyanide	Acidification, Nitrogen Purge	§7.3.3.2	SO	(3)
Releasable Sulfide	Acidification, Nitrogen Purge	§7.3.4.2	SO	(3)
Toxicity Characteristic Leaching Procedure (TCLP)	Liquid Extraction	1311	W,SO	(4)
ORGANICS				
Acid Extractable Organic Compounds	Gas Chromatography/Mass Spectrometry	8270	W,SO	(3)
Base-Neutral Extractable Organic Compounds	Gas Chromatography/Mass Spectrometry	8270	W,SO	(3)
Biochemical Oxygen Demand	BOD (5 day, 20C)	405.1	W	(2)
Ethylene Glycol	Gas Chromatography - FID	3580/8100-M	W,SO	(3)
Halogenated Hydrocarbon Pesticides	Gas Chromatography - ECD	3520/3540 8080	W,SO	(3)
Methanol	Gas Chromatography - FID California method	8015-M	W,SO	(1)
Phenoxy Acid Herbicides	Gas Chromatography - ECD	8150	W,SO	(3)
Total Petroleum Hydrocarbons	Spectrophotometric - Infrared after Soxhlet extraction (SW846 9071)	418.1	SO	(2)
Volatile Organic Compounds	Gas Chromatography/Mass Spectrometry	8240	W,SO	(3)

**Individual Data Sheets**  
**Alcohols 8015-M**

1  
TCLP ALCOHOL ANALYSIS DATA SHEET

CLIENT SAMPLE ID

Lab Name: EA LABORATORIES

Contract: \_\_\_\_\_

WG1-DS

Lab Code: EAENG Case #: \_\_\_\_\_ SAS #: \_\_\_\_\_ SDG No.: WG1-DS

Matrix: (soil/water) TCLP WATER Lab Sample ID: 3034

Sample wt/vol: 150 ml Lab File ID: 010F0101.D

Level: (low/med) LOW Date Received: 23 APR 92

% Moisture: N/A Date Extracted: 24 APR 92

Extraction: TCLP Date Analyzed: 15 MAY 92  
19:33

GPC Cleanup:(Y/N) N/A pH: N/A Dilution Factor: 1

=====			
CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		mg/L or mg/Kg	Q
<u>67-36-1</u>	METHANOL	< 10.000	U
<u>71-36-3</u>	1-BUTANOL	< 10.000	U
<u>78-92-2</u>	2-BUTANOL	< 10.000	U
=====			

1  
TCLP ALCOHOL ANALYSIS DATA SHEET

CLIENT SAMPLE ID

Lab Name: EA LABORATORIES

Contract: \_\_\_\_\_

WG2-DS

Lab Code: EAENG Case #: \_\_\_\_\_ SAS #: \_\_\_\_\_ SDG No.: WG1-DS

Matrix: (soil/water) TCLP WATER Lab Sample ID: 3035

Sample wt/vol: 150 ml Lab File ID: 011F0101.D

Level: (low/med) LOW Date Received: 23 APR 92

% Moisture: N/A Date Extracted: 24 APR 92

Extraction: TCLP Date Analyzed: 15 MAY 92  
19:57

GPC Cleanup:(Y/N) N/A pH: N/A Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		mg/L or mg/Kg	Q
<u>67-56-1</u>	METHANOL	< 10.000	U
<u>71-36-3</u>	1-BUTANOL	< 10.000	U
<u>78-92-2</u>	2-BUTANOL	< 10.000	U

1  
TCLP ALCOHOL ANALYSIS DATA SHEET

CLIENT SAMPLE ID

Lab Name: EA LABORATORIES

Contract: \_\_\_\_\_

INSTRUMENT BLANK

Lab Code: EAENG

Case #: \_\_\_\_\_

SAS #: \_\_\_\_\_

SDG No.: WG1-DS

Matrix: (soil/water)

TCLP WATER

Lab Sample ID: IBLK #1

Sample wt/vol:

150 ml

Lab File ID: 008F0101.D

Level: (low/med)

LOW

Date Received: N/A

% Moisture:

N/A

Date Extracted: N/A

Extraction:

TCLP

Date Analyzed: 15 MAY 92  
18:46

GPC Cleanup:(Y/N) N/A

pH: N/A

Dilution Factor: 1

=====			
CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		mg/L or mg/Kg	Q
<u>67-56-1</u>	METHANOL	< 10.000	U
<u>71-36-3</u>	1-BUTANOL	< 10.000	U
<u>78-92-2</u>	2-BUTANOL	< 10.000	U
=====			

1  
TCLP ALCOHOL ANALYSIS DATA SHEET

CLIENT SAMPLE ID

Lab Name: EA LABORATORIES

Contract: \_\_\_\_\_

METHOD BLANK

Lab Code: EAENG

Case #: \_\_\_\_\_

SAS #: \_\_\_\_\_

SDG No.: WG1-DS

Matrix: (soil/water)

TCLP WATER

Lab Sample ID: TBLK 643

Sample wt/vol:

150 ml

Lab File ID: 009F0101.D

Level: (low/med)

LOW

Date Received: N/A

% Moisture:

N/A

Date Extracted: 24 APR 92

Extraction:

TCLP

Date Analyzed: 15 MAY 92

19:09

GPC Cleanup:(Y/N) N/A

pH: N/A

Dilution Factor: 1

=====			
CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		mg/L or mg/Kg	Q
<u>67-56-1</u>	METHANOL	< 10.000	U
<u>71-36-3</u>	1-BUTANOL	< 10.000	U
<u>78-92-2</u>	2-BUTANOL	< 10.000	U
=====			



**INDIVIDUAL DATA SHEETS**  
**Semivolatiles - 8270**

1B  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: EA LABS

Contract:

WG1-D/S

Lab Code: EAENG

Case No: *willow*  
*SAC*

SAS No.: \_\_\_\_\_

SDG No:

*804*  
*5/14/92*

Matrix: (soil/water) WATER

Lab Sample ID: 3034

Sample wt/vol: .500 (g/mL) ML

Lab File ID: DK807

Level: (low/med) LOW

Date Received: 04/23/92

% Moisture: \_\_\_\_\_ decanted: (Y/N) N

Date Extracted: 04/25/92

Concentrated Extract Volume: 1000(uL)

Date Analyzed: 04/28/92

Injection Volume: 1.0 (uL)

Dilution Factor: 5.0

GPC Cleanup: (Y/N)N

pH: \_\_\_\_\_

CONCENTRATION UNITS:  
(ug/L or ug/Kg)ug/L

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)ug/L	Q
108-94-1-----	Cyclohexanone_____	50	U
110-86-1-----	Pyridine_____	50	U
106-46-7-----	1,4-Dichlorobenzene_____	50	U
95-50-1-----	1,2-Dichlorobenzene_____	50	U
95-48-7-----	2-Methylphenol_____	50	U
106-44-5-----	3+4-Methylphenol_____	50	U
67-72-1-----	Hexachloroethane_____	50	U
98-95-3-----	Nitrobenzene_____	50	U
87-68-3-----	Hexachlorobutadiene_____	50	U
88-06-2-----	2,4,6-Trichlorophenol_____	50	U
95-95-4-----	2,4,5-Trichlorophenol_____	50	U
121-14-2-----	2,4-Dinitrotoluene_____	50	U
118-74-1-----	Hexachlorobenzene_____	50	U
87-86-5-----	Pentachlorophenol_____	250	U

1B  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

WG1-D55RE

Lab Name: EA LABS

Contract: WILLOW GROV

Lab Code: EAENG

Case No:

SAS No.: \_\_\_\_\_

SDG No:

0589L

Matrix: (soil/water) WATER

Lab Sample ID: 3034

Sample wt/vol: 500 (g/mL) ML

Lab File ID: G03389

Level: (low/med) LOW

Date Received: 04/23/92

% Moisture: \_\_\_\_\_ decanted: (Y/N) N

Date Extracted: 05/01/92

Concentrated Extract Volume: 1000(uL)

Date Analyzed: 05/04/92

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N)N

pH: \_\_\_\_\_

CAS NO.

COMPOUND

CONCENTRATION UNITS:  
(ug/L or ug/Kg)ug/L

Q

108-94-1-----	CYCLOHEXANONE	10	U
110-86-1-----	PYRIDINE	10	U
106-46-7-----	1,4-DICHLOROBENZENE	10	U
95-50-1-----	1,2-DICHLOROBENZENE	10	U
95-48-7-----	2-METHYLPHENOL	10	U
106-44-5-----	3+4-Methylphenol	10	U
67-72-1-----	HEXACHLOROETHANE	10	U
98-95-3-----	NITROBENZENE	10	U
87-68-3-----	HEXACHLOROBUTADIENE	10	U
88-06-2-----	2,4,6-TRICHLOROPHENOL	10	U
95-95-4-----	2,4,5-TRICHLOROPHENOL	10	U
121-14-2-----	2,4-DINITROTOLUENE	10	U
118-74-1-----	HEXACHLOROBENZENE	10	U
87-86-5-----	PENTACHLOROPHENOL	50	U

1B  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

Lab Name: EA LABS

Contract:

WG2-D<sup>1</sup>/S

Lab Code: EAENG

Case No: SMC

SAS No.: \_\_\_\_\_

SDG No:

864  
5/14/92

Matrix: (soil/water) WATER

Lab Sample ID: 3035

Sample wt/vol: 500 (g/mL) ML

Lab File ID: DK809

Level: (low/med) LOW

Date Received: 04/23/92

% Moisture: \_\_\_\_\_ decanted: (Y/N) N

Date Extracted: 04/25/92

Concentrated Extract Volume: 1000(uL)

Date Analyzed: 04/28/92

Injection Volume: 1.0 (uL)

Dilution Factor: 5.0

GPC Cleanup: (Y/N)N

pH: \_\_\_\_\_

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg)ug/L	Q
108-94-1-----	Cyclohexanone_____	50	U
110-86-1-----	Pyridine_____	50	U
106-46-7-----	1,4-Dichlorobenzene_____	50	U
95-50-1-----	1,2-Dichlorobenzene_____	50	U
95-48-7-----	2-Methylphenol_____	50	U
106-44-5-----	3+4-Methylphenol_____	50	U
67-72-1-----	Hexachloroethane_____	50	U
98-95-3-----	Nitrobenzene_____	50	U
87-68-3-----	Hexachlorobutadiene_____	50	U
88-06-2-----	2,4,6-Trichlorophenol_____	50	U
95-95-4-----	2,4,5-Trichlorophenol_____	50	U
121-14-2-----	2,4-Dinitrotoluene_____	50	U
118-74-1-----	Hexachlorobenzene_____	50	U
87-86-5-----	Pentachlorophenol_____	250	U

1B  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

SBLK#644

Lab Name: EA LABS

Contract:

Lab Code: EAENG

Case No:

*willow*

SAS No.:

SDG No:

Matrix: (soil/water) WATER

Lab Sample ID: 644

Sample wt/vol:

500 (g/mL) ML

Lab File ID: FI281

Level: (low/med) LOW

Date Received: / /

% Moisture: \_\_\_\_\_ decanted: (Y/N) N

Date Extracted: 04/25/92

Concentrated Extract Volume: 1000(uL)

Date Analyzed: 04/27/92

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N)N

pH: \_\_\_\_\_

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)ug/L	Q
108-94-1-----	Cyclohexanone	10	U
110-86-1-----	Pyridine	10	U
106-46-7-----	1,4-Dichlorobenzene	10	U
95-50-1-----	1,2-Dichlorobenzene	10	U
95-48-7-----	2-Methylphenol	10	U
106-44-5-----	3+4-Methylphenol	10	U
67-72-1-----	Hexachloroethane	10	U
98-95-3-----	Nitrobenzene	10	U
87-68-3-----	Hexachlorobutadiene	10	U
88-06-2-----	2,4,6-Trichlorophenol	10	U
95-95-4-----	2,4,5-Trichlorophenol	10	U
121-14-2-----	2,4-Dinitrotoluene	10	U
118-74-1-----	Hexachlorobenzene	10	U
87-86-5-----	Pentachlorophenol	50	U

1B  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

SBLK

Lab Name: EA LABS

Contract: WILLOW GROV

Lab Code: EAENG

Case No:

SAS No.: \_\_\_\_\_

SDG No:

Matrix: (soil/water) WATER

Lab Sample ID: 666

Sample wt/vol: 500 (g/mL) ML

Lab File ID: G03386

Level: (low/med) LOW

Date Received: / /

% Moisture: \_\_\_\_\_ decanted: (Y/N) N

Date Extracted: 05/01/92

Concentrated Extract Volume: 1000(uL)

Date Analyzed: 05/04/92

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N)N

pH: \_\_\_\_\_

CONCENTRATION UNITS:  
(ug/L or ug/Kg)ug/L

CAS NO.	COMPOUND	Q
108-94-1-----	CYCLOHEXANONE	10 U
110-86-1-----	PYRIDINE	10 U
106-46-7-----	1,4-DICHLOROBENZENE	10 U
95-50-1-----	1,2-DICHLOROBENZENE	10 U
95-48-7-----	2-METHYLPHENOL	10 U
106-44-5-----	3+4-Methylphenol	10 U
67-72-1-----	HEXACHLOROETHANE	10 U
98-95-3-----	NITROBENZENE	10 U
87-68-3-----	HEXACHLOROBUTADIENE	10 U
88-06-2-----	2,4,6-TRICHLOROPHENOL	10 U
95-95-4-----	2,4,5-TRICHLOROPHENOL	10 U
121-14-2-----	2,4-DINITROTOLUENE	10 U
118-74-1-----	HEXACHLOROBENZENE	10 U
87-86-5-----	PENTACHLOROPHENOL	50 U

1B  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

TBLK#642

Lab Name: EA LABS

Contract:

Lab Code: EAENG

Case No: *willow* ~~SME~~

SAS No.: \_\_\_\_\_

SDG No:

Matrix: (soil/water) WATER

*5/30/92*  
*Boo*

Lab Sample ID: 642

Sample wt/vol:

500 (g/mL) ML

Lab File ID: FI262

Level: (low/med) LOW

Date Received: 04/23/92

% Moisture: \_\_\_\_\_ decanted: (Y/N) N

Date Extracted: 04/25/92

Concentrated Extract Volume: 1000(uL)

Date Analyzed: 04/27/92

Injection Volume: 1.0 (uL)

Dilution Factor: 5.0

GPC Cleanup: (Y/N)N

pH: \_\_\_\_\_

CONCENTRATION UNITS:  
(ug/L or ug/Kg)ug/L

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)ug/L	Q
108-94-1-----	Cyclohexanone_____	50	U
110-86-1-----	Pyridine_____	50	U
106-46-7-----	1,4-Dichlorobenzene_____	50	U
95-50-1-----	1,2-Dichlorobenzene_____	50	U
95-48-7-----	2-Methylphenol_____	50	U
106-44-5-----	3+4-Methylphenol_____	50	U
67-72-1-----	Hexachloroethane_____	50	U
98-95-3-----	Nitrobenzene_____	50	U
87-68-3-----	Hexachlorobutadiene_____	50	U
88-06-2-----	2,4,6-Trichlorophenol_____	50	U
95-95-4-----	2,4,5-Trichlorophenol_____	50	U
121-14-2-----	2,4-Dinitrotoluene_____	50	U
118-74-1-----	Hexachlorobenzene_____	50	U
87-86-5-----	Pentachlorophenol_____	250	U

1B  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

TBLK

Lab Name: EA LABS

Contract: WILLOW GROV

Lab Code: EAENG

Case No:

SAS No.: \_\_\_\_\_

SDG No:

Matrix: (soil/water) WATER

Lab Sample ID: 663

Sample wt/vol: 500 (g/mL) ML

Lab File ID: G03388

Level: (low/med) LOW

Date Received: 04/23/92

% Moisture: \_\_\_\_\_ decanted: (Y/N) N

Date Extracted: 05/01/92

Concentrated Extract Volume: 1000(uL)

Date Analyzed: 05/04/92

Injection Volume: 2.0 (uL)

Dilution Factor: 1:0

GPC Cleanup: (Y/N)N pH: \_\_\_\_\_

CAS NO.

COMPOUND

CONCENTRATION UNITS:  
(ug/L or ug/Kg)ug/L

Q

108-94-1-----	CYCLOHEXANONE	10	U
110-86-1-----	PYRIDINE	10	U
106-46-7-----	1,4-DICHLOROBENZENE	10	U
95-50-1-----	1,2-DICHLOROBENZENE	10	U
95-48-7-----	2-METHYLPHENOL	10	U
106-44-5-----	3+4-Methylphenol	10	U
67-72-1-----	HEXACHLOROETHANE	10	U
98-95-3-----	NITROBENZENE	10	U
87-68-3-----	HEXACHLOROBUTADIENE	10	U
88-06-2-----	2,4,6-TRICHLOROPHENOL	10	U
95-95-4-----	2,4,5-TRICHLOROPHENOL	10	U
121-14-2-----	2,4-DINITROTOLUENE	10	U
118-74-1-----	HEXACHLOROENZENE	10	U
87-86-5-----	PENTACHLOROPHENOL	50	U



**INDIVIDUAL DATA SHEETS**  
**Pesticides/PCBs**

EA Laboratories  
TCLP Pesticide/PCB Report Sheet

Project/Client: WILLOW GROVE NAS  
Matrix: TCLP  
Date Received: 04/23/92  
Date Extracted: 05/01/92  
Date Analyzed: 05/08/92

EA Number: 3034  
Units: ug/L or ppb  
Dilution Factor: 1  
Extraction volume: 500mL  
Final volume: 5mL

Analyte	WG1-DS	Detection Limit
Pesticides:		
gamma BHC	ND	0.050
TECHNICAL CHLORDANE	ND	1.0
ENDRIN	ND	0.10
HEPTACHLOR	ND	0.050
HEPTACHLOR EPOXIDE	ND	0.050
METHOXYCHLOR	ND	0.50
TOXAPHENE	ND	1.0

ND: Indicates not detected.

EA Laboratories  
TCLP Pesticide/PCB Report Sheet

Project/Client: WILLOW GROVE NAS  
Matrix: TCLP  
Date Received: 04/23/92  
Date Extracted: 04/25/92  
Date Analyzed: 04/29/92

EA Number: 3035  
Units: ug/L or ppb  
Dilution Factor: 1  
Extraction volume: 500mL  
Final volume: 5mL

Analyte	WG2-DS	Detection Limit
-----		
Pesticides:		
gamma BHC	ND	0.050
TECHNICAL CHLORDANE	ND	1.0
ENDRIN	ND	0.10
HEPTACHLOR	0.16	0.16
HEPTACHLOR EPOXIDE	ND	0.050
METHOXYCHLOR	ND	0.50
TOXAPHENE	ND	1.0
-----		

ND: Indicates not detected.

*John* 5/14/92

EA Laboratories  
TCLP Pesticide/PCB Report Sheet

Project/Client: WILLOW GROVE NAS  
Matrix: TCLP  
Date Received: LAB GENERATED  
Date Extracted: 04/25/92  
Date Analyzed: 04/29/92

EA Number: TBLK642  
Units: ug/L or ppb  
Dilution Factor: 1  
Extraction volume: 500mL  
Final volume: 5mL

Analyte	METHOD BLANK	Detection Limit
-----		
Pesticides:		
gamma BHC	ND	0.050
TECHNICAL CHLORDANE	ND	1.0
ENDRIN	ND	0.10
HEPTACHLOR	ND	0.050
HEPTACHLOR EPOXIDE	ND	0.050
METHOXYCHLOR	ND	0.50
TOXAPHENE	ND	1.0
-----		

ND: Indicates not detected.

EA Laboratories  
TCLP Pesticide/PCB Report Sheet

Project/Client: WILLOW GROVE NAS  
Matrix: TCLP  
Date Received: LAB GENERATED  
Date Extracted: 04/25/92  
Date Analyzed: 04/29/92

EA Number: PBLK647  
Units: ug/L or ppb  
Dilution Factor: 1  
Extraction volume: 500mL  
Final volume: 5mL

Analyte	METHOD BLANK	Detection Limit
-----		
Pesticides:		
gamma BHC	ND	0.050
TECHNICAL CHLORDANE	ND	1.0
ENDRIN	ND	0.10
HEPTACHLOR	ND	0.050
HEPTACHLOR EPOXIDE	ND	0.050
METHOXYCHLOR	ND	0.50
TOXAPHENE	ND	1.0
-----		

ND: Indicates not detected.

EA Laboratories  
TCLP Pesticide/PCB Report Sheet

Project/Client: WILLOW GROVE NAS  
Matrix: TCLP  
Date Received: LAB GENERATED  
Date Extracted: 05/01/92  
Date Analyzed: 05/08/92

EA Number: TBLK663  
Units: ug/L or ppb  
Dilution Factor: 1  
Extraction volume: 500mL  
Final volume: 5mL

Analyte	METHOD BLANK	Detection Limit
-----		
Pesticides:		
gamma BHC	ND	0.050
TECHNICAL CHLORDANE	ND	1.0
ENDRIN	ND	0.10
HEPTACHLOR	ND	0.050
HEPTACHLOR EPOXIDE	ND	0.050
METHOXYCHLOR	ND	0.50
TOXAPHENE	ND	1.0
-----		

ND: Indicates not detected.

EA Laboratories  
TCLP Pesticide/PCB Report Sheet

Project/Client: WILLOW GROVE NAS  
Matrix: TCLP  
Date Received: LAB GENERATED  
Date Extracted: 05/01/92  
Date Analyzed: 05/08/92

EA Number: PBLK665  
Units: ug/L or ppb  
Dilution Factor: 1  
Extraction volume: 500mL  
Final volume: 5mL

Analyte	METHOD BLANK	Detection Limit
-----		
Pesticides:		
gamma BHC	ND	0.050
TECHNICAL CHLORDANE	ND	1.0
ENDRIN	ND	0.10
HEPTACHLOR	ND	0.050
HEPTACHLOR EPOXIDE	ND	0.050
METHOXYCHLOR	ND	0.50
TOXAPHENE	ND	1.0
-----		

ND: Indicates not detected.

**INDIVIDUAL DATA SHEETS**  
**Pesticides/Herbicides**



EA Laboratories  
Herbicide Report Sheet

Project/Client:	WILLOW GROVE NAS	EA Number:	3034
Matrix:	WATER	Units:	ug/L or ppb
Date Received:	04/23/92	Dilution Factor:	1
Date Extracted:	04/27/92	Extraction volume:	500mL
Date Analyzed:	04/28/92	Final volume:	5.0mL

Analyte	WG-1 DS	Detection Limit
-----		
Herbicides:		
2,4-D	ND	1.5
2,4,5-TP	ND	0.11
-----		

ND: Indicates not detected.

EA Laboratories  
Herbicide Report Sheet

Project/Client:	WILLOW GROVE NAS	EA Number:	3035
Matrix:	WATER	Units:	ug/L or ppb
Date Received:	04/23/92	Dilution Factor:	1
Date Extracted:	04/27/92	Extraction volume:	500mL
Date Analyzed:	04/28/92	Final volume:	5.0mL

Analyte	WG-2 DS	Detection Limit
-----		
Herbicides:		
2,4-D	ND	1.5
2,4,5-TP	ND	0.11
-----		

ND: Indicates not detected.

EA Laboratories  
Herbicide Report Sheet

Project/Client:	WILLOW GROVE NAS	EA Number:	TBLK 0642
Matrix:	WATER	Units:	ug/L or ppb
Date Received:	LAB GENERATED	Dilution Factor:	1
Date Extracted:	04/27/92	Extraction volume:	500mL
Date Analyzed:	04/28/92	Final volume:	5.0mL

Analyte	TCLP BLANK	Detection Limit
-----		
Herbicides:		
2,4-D	ND	1.5
2,4,5-TP	ND	0.11
-----		

ND: Indicates not detected.

EA Laboratories  
Herbicide Report Sheet

Project/Client:	WILLOW GROVE NAS	EA Number:	HBLK 0649
Matrix:	WATER	Units:	ug/L or ppb
Date Received:	LAB GENERATED	Dilution Factor:	1
Date Extracted:	04/27/92	Extraction volume:	500mL
Date Analyzed:	04/28/92	Final volume:	5.0mL

Analyte	METHOD BLANK	Detection Limit
-----		
Herbicides:		
2,4-D	ND	1.5
2,4,5-TP	ND	0.11
-----		

ND: Indicates not detected.

INDIVIDUAL DATA SHEETS  
ETHYLENE GLYCOL

1  
ETHYLENE GLYCOL ANALYSIS DATA SHEET

CLIENT SAMPLE ID

Lab Name: EA LABORATORIES

Contract: \_\_\_\_\_

WG-MG-1

Lab Code: EAENG

Case #: \_\_\_\_\_

SAS #: \_\_\_\_\_

SDG No.: \_\_\_\_\_

Matrix: (soil/water)

WATER

Lab Sample ID: 3036 x 50

Sample wt/vol: N/A

mL

Lab File ID: 012F0101.D

Level: (low/med)

LOW

Date Received: 23 APR 92

% Moisture: N/A

Date Extracted: N/A

Extraction: N/A

Date Analyzed: 04 MAY 92

GPC Cleanup: (Y/N)

N/A

pH: N/A

12:36  
Dilution Factor: 50

CAS NO.

COMPOUND

CONCENTRATION UNITS:

mg/L

Q

107-21-1

ETHYLENE GLYCOL

11800

1  
ETHYLENE GLYCOL ANALYSIS DATA SHEET

CLIENT SAMPLE ID

Lab Name: EA LABORATORIES

Contract: \_\_\_\_\_

WG-MG-2

Lab Code: EAENG

Case #: \_\_\_\_\_

SAS #: \_\_\_\_\_

SDG No.: \_\_\_\_\_

Matrix: (soil/water) WATER

Lab Sample ID: 3037 x 50

Sample wt/vol: N/A mL

Lab File ID: 014F0101.D

Level: (low/med) LOW

Date Received: 23 APR 92

% Moisture: N/A

Date Extracted: N/A

Extraction: N/A

Date Analyzed: 04 MAY 92  
13:18

GPC Cleanup:(Y/N) N/A pH: N/A

Dilution Factor: 50

CAS NO.

COMPOUND

CONCENTRATION UNITS:

mg/L

Q

107-21-1

ETHYLENE GLYCOL

14100

1  
ETHYLENE GLYCOL ANALYSIS DATA SHEET

CLIENT SAMPLE ID

Lab Name: EA LABORATORIES

Contract: \_\_\_\_\_

WG-MG-3

Lab Code: EAENG

Case #: \_\_\_\_\_

SAS #: \_\_\_\_\_

SDG No.: \_\_\_\_\_

Matrix: (soil/water)

WATER

Lab Sample ID: 3038 x 50

Sample wt/vol: N/A

mL

Lab File ID: 016F0101.D

Level: (low/med)

LOW

Date Received: 23 APR 92

% Moisture:

N/A

Date Extracted: N/A

Extraction:

N/A

Date Analyzed: 04 MAY 92

14:00

GPC Cleanup: (Y/N)

N/A

pH: N/A

Dilution Factor: 50

CAS NO.

COMPOUND

CONCENTRATION UNITS:

mg/L

Q

107-21-1

ETHYLENE GLYCOL

12000



Company Name: <b>EA ENG.</b>				Project Manager or Contact: <b>G.T. CAMPBELL</b> Phone: 410-771-4950 x310				<div style="text-align: center;"> <p><b>EA Laboratories</b> 19 Loveton Circle Sparks, MD 21152 (301) 771-4920</p> </div>															
Project No.: <b>10388.06</b>				Project Name: <b>Willow Grove NAS</b>																			
Sample Storage Location: <b>N9</b>								<div style="text-align: center;"> <b>Chain-of-Custody Record</b>  <b>EA Standard Report</b>  <b>Normal TAT. DATE DUE: 5/14/92</b> </div>															
Page / of /				Batch ID: <b>0530</b>				<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">No. of Containers</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Parameters/Method Numbers for Analysis*</div> </div>															
Date	Time	Water	Soil	Sample Identification (ID and Matrix) 19 Characters																			
4-21-92	1200		X	WG1-DS				4	TCLP	LDR	Reg. Alcohols	2 LDR VOC not on TCLP list	2 LDR SVOC not on TCLP list	Correctivity SW-846-8090	Ignitability SW-846-7.1	Reactivity SW-846-7.332	TPH 9071/418.1	BOD	Glycol (%)	EA Labs Accession Number	Remarks		
4-22-92	1500		X	WG2-DS				4	X	X	X	X	X	X	X	X	X	X		3034	① Includes TCLP for VOC, SVOC, Metals, Pest, and Herbicides ② 11 LDR VOC not on TCLP list see attached sheets ③ 2 LDR SVOC not on TCLP list see attached sheets ④ % Glycol: Caution - conc. of Glycol may be extremely high		
																			3035				
4-23-92	0830	X		WG-MG-1				4										X		3036	Standard EA Report Standard <del>5 day</del> TAT 21 JEH		
4-23-92	0840	X		WG-MG-2				4										X		3037			
4-23-92	0850	X		WG-MG-3				4										X		3038			
Sampled by: (Signature) <i>[Signature]</i>				Date/Time: 4-23-92 1200		Relinquished by: (Signature) <i>[Signature]</i>				Date/Time: 4-23-92 1600		Received by: (Signature) <i>[Signature]</i>				Date/Time: 4-23-92 1600							
Received by: (Signature)				Date/Time:		Received by: (Signature)				Date/Time:		Holding Times for VOAs				Sample Shipped by: (Circle)							
Cooler Temp.: 24 C				pH: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Comments: <i>[Signature]</i>										Fed. Ex. <input type="checkbox"/> Puro. <input type="checkbox"/> UPS <input type="checkbox"/>				Other: <i>hand carried</i>			
*NOTE: Please indicate method number for analyses requested. This will help clarify any questions with laboratory technicians.																				Air Bill Number:			

LABORATORY DATA REPORT

Prepared for:

NAS Willow Grove

Prepared by:

EA Laboratories  
19 Loveton Circle  
Sparks, Maryland 21152

July 1992

EA Laboratories  
ANALYTICAL NARRATIVE

Client: Willow Grove NAS  
Project number: 10388.06

Laboratory Project Manager: Joanne Heffleger  
EA Laboratories Report: 920693  
Date: 2 July 1992

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This report contains the results of the analysis of three water samples collected on 25 June 1992 in support of the referenced project. The samples arrived handcarried and intact at EA Laboratories on 25 June 1992. Upon receipt, the samples were inspected, compared with the chain-of-custody record, logged into the laboratory computer system with assigned laboratory accession numbers, and released for analysis. Biochemical Oxygen Demand was determined according to U.S.A. EPA Method 405.1.

<u>Client Sample Name</u>	<u>EA Lab Number</u>
WG-EG-1	4241
WG-EG-2	4242
WG-EG-3	4243

Results are reported in Table 1 which follows.

General Chemistry

Each sample was prepared with 15 dilutions (5 on the straight sample, 5 on a 10X dilution, 5 on a 100X dilution). An average result for all of the dilutions which produced oxygen depletion in the proper range was reported.

Quality Control

This section summarizes the general quality control activities performed by the laboratory which relate to laboratory method performance, sample matrix effects, and field quality control samples. Quality control samples specified by the project and in the analytical methods are analyzed and reported as required, and the data are validated by analyst, staff, and supervisor

EA Laboratories  
ANALYTICAL NARRATIVE

Client: Willow Grove NAS  
Project number: 10388.06

Laboratory Project Manager: Joanne Heffleger  
EA Laboratories Report: 920693  
Date: 2 July 1992

---

review.

Laboratory method performance: All quality control criteria for method performance must be met for data to be reported. These criteria generally apply to instrument tune, calibration, method blanks, and Laboratory Control Samples (LCS).

Sample matrix effects: Quality control samples are analyzed to determine any measurement bias due to the sample, and may include matrix spikes (MS), matrix spike duplicates (MSD), and laboratory duplicates (D). If criteria are not met, matrix interferences are confirmed either by reanalysis or by inspection of the LCS results to verify that laboratory method performance is in control. Data are reported with appropriate qualifiers or discussion.

Field quality control samples: Field duplicates, trip blanks, and rinsate blanks are used to evaluate field quality control. Unless specific laboratory performance criteria and corrective actions are identified in the project requirements, results are reported after routine laboratory data validation.

**Certification of Results**

The Laboratory certifies that this report meets the project requirements for analytical data as stated in the Analytical Task Order (ATO) and the chain-of-custody. In addition, the Laboratory certifies that the data as reported meet the Data Quality Objectives for precision, accuracy, and completeness specified for this project or as stated in EA Laboratories Quality Assurance

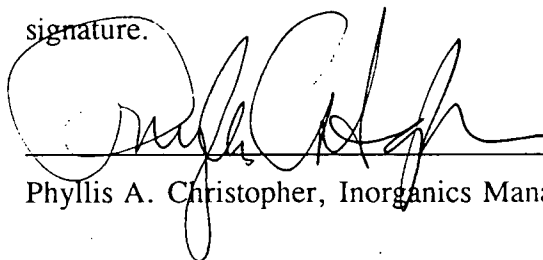
EA Laboratories  
ANALYTICAL NARRATIVE

Client: Willow Grove NAS  
Project number: 10388.06

Laboratory Project Manager: Joanne Heffleger  
EA Laboratories Report: 920693  
Date: 2 July 1992

---

program for other than the conditions detailed above. Release of the data contained in this report has been authorized by the appropriate Laboratory Manager as verified by the following signature.

A handwritten signature in black ink, appearing to read 'Phyllis A. Christopher', is written over a horizontal line.

July 2, 1992

Phyllis A. Christopher, Inorganics Manager

TABLE 1.  
RESULTS FOR THE DETERMINATION  
OF BIOCHEMICAL OXYGEN DEMAND IN  
THREE WATER SAMPLES COLLECTED  
AT THE WILLOW GROVE SITE  
ON 25 JUNE 1992

Sample Designation	BOD mg/L	Accession Number
WG-EG-1	1160	4241
WG-EG-2	8690	4242
WG-EG-3	10500	4243



APPENDIX B

WASTEWATER LOADING CALCULATIONS



## APPENDIX B

Plant Flow - 150,000 - 170,000 gpd

Type - Two-stage trickling filter with recycle

Waste - 20 drums, 1 percent ethylene glycol  
BOD<sub>5</sub> 8,000 - 10,000 ppm

Assume worst case of 10,000 ppm BOD<sub>5</sub>  
 $20 \times 55 \text{ gal/drum} = 1,100 \text{ gallons}$

$$(1,100 \text{ gal}/1,000,000) = 8.34 \times 10,000 \text{ ppm} = 91 \text{ lb BOD}$$

Say 100 lb of BOD<sub>5</sub> in the waste or 1 drums = 5 lb BOD<sub>5</sub>.

To minimize load to plant, limit the increase in BOD at the plant headworks to 15 ppm.  
This equates to less than 5 percent BOD load increase.

$$15 \text{ ppm} \times 8.34 \times 160,000 \text{ g/d} \div 1,000,000 = 20 \text{ lb/day}$$
$$20 \text{ lb/day} \times 1 \text{ drum}/5 \text{ lb/day} = 4 \text{ drums/day}$$

∴ To limit increase of influent flow, BOD to 15 ppm, add 4 drums/day over a 24-hour period, or add at 9 gal/hour or 0.15 gpm or 0.6 liters/min.

An increase of 15 ppm of BOD<sub>5</sub> was chosen to conservatively prevent NPDES non-compliance and to keep BOD loadings on the trickling filter below an increase of 1 lb/day/1,000 ft<sup>3</sup>.

At 4 drums/day, the waste will be tested in 5 days or 1 work week.